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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 09/809,038  | 03/16/2001  | Shuji Nakamura       | 160-356             | 5596             |
| 23117   | 7590        | 03/18/2004           | EXAMINER            |                  |
| NIXON & VANDERHYE, PC<br>1100 N GLEBE ROAD<br>8TH FLOOR<br>ARLINGTON, VA 22201-4714 |             |                      | LOUIE, WAI SING     |                  |
|   |             | ART UNIT             | PAPER NUMBER        |                  |
|   |             | 2814                 |                     |                  |

DATE MAILED: 03/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 09/809,038             | NAKAMURA ET AL.     |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Wai-Sing Louie         | 2814                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 16 January 2004.
- 2a) This action is **FINAL**.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 64,66 and 71 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 64,66 and 71 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_.
- 4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_ .
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_\_.

## DETAILED ACTION

### *Double Patenting*

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 64, 66, and 71 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-12 of U.S. Patent No. 5,652,434 in view of Edmond et al. (US 5,592,501) and Mannou et al. (US 5,270,246).

With regard to claim 63-64, US 5,652,434 discloses a gallium nitride light-emitting device comprising:

- An n-type layer comprising an n-type GaN (claim 1) or an n-type nitride semiconductor containing indium and gallium (claim 2);
- A first p-type layer comprising a p-type nitride semiconductor containing aluminum, indium and gallium (claim 1 and 2);
- US 5,652,434 does not disclose an active layer. However, Edmond et al. disclose an active layer 11 provided between the n-type and p-type clad layers 14 and 15 having a quantum well structure comprising InGaN (Edmond col. 4, line 66 to

col. 5, line 23 and fig. 1). Edmond et al. teach using a quantum well structure has the lowest bandgap into which electrons tends to fall, thus helping enhance the confinement (Edmond col. 5, lines 16-30). Therefore, it would have been obvious to one with ordinary skill in the art to modify the device in US 5,652,434 with the teaching of Edmond et al. to provide a quantum well structure having an InGaN well layer. Doing so would enhance the carrier confinement;

- US 5,652,434 discloses a first p-type layer comprising a p-type nitride semiconductor containing aluminum, indium, and gallium (claim 1 and 2), does not disclose a second p-type clad layer. However, Mannou et al. disclose a first p-type clad layer 44 and a second p-type cladding layer 46 (Mannou col. 3, lines 35-60). Mannou et al. teach the multiple cladding layers would suppress diffusion of dopants and would increase yield of the device (Mannou col. 1, lines 62-66). Hence, it would have been obvious to one with ordinary skill in the art to modify the device in US 5,652,434 with the teaching of Mannou et al. to provide a second p-type clad layer in order to prevent diffusion of dopants;
- US 5,652,434 does not disclose a p-type contact layer formed of a p-type GaN provided over the first p-type clad layer. However, Edmond discloses a p-type GaN contact layer 16 (Edmond col. 5, line 13 and col. 6, lines 11-13). Edmond et al. teach the contact layer can serve as the top contact and minimizing strain for the overall structure (Edmond col. 5, lines 13-14). Hence, it would have been obvious to one with ordinary skill in the art to modify the device in US 5,652,434

with the teaching of Edmond et al. to provide a contact layer in order to provide the top contact and minimizing strain for the overall structure.

With regard to claim 66, US 5,652,434 disclose an n-type contact formed of an n-type GaN (claim 1) and US 5,652,434 modified by Edmond et al. in claim 63 above, would have the p-type contact layer 16 formed of p-type GaN.

With regard to claim 71, in addition to the limitations disclosed in claim 63 and 64, US 5,652,434 also discloses:

- An n-type clad layer comprising an n-type nitride semiconductor containing indium and gallium (claim 1 and 2);
- US 5,652,434 discloses the first n-type layer comprising a n-type nitride semiconductor containing aluminum, indium, and gallium (claim 1 and 2), but does not disclose a second n-type clad layer. However, the p-type cladding could have two separate layers to minimize diffusion of dopants and, therefore, the n-type cladding could also have two separate layers, which is merely a duplication of useful parts. Duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 64, 66, and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edmond et al. (US 5,592,501) in view of Mannou et al. (US 5,270,246).

With regard to claims 63 and 64, Edmond et al. disclose a gallium nitride light-emitting device (col. 4, line 55 to col. 9, line 43 and fig. 1) comprising:

- An n-type layer comprising an n-type GaN (col. 6, lines 4-6 and fig. 1);
- A first p-type clad layer comprising a p-type nitride semiconductor, but do not disclose the layer containing indium and gallium. However, Edmond et al. teach the III-V nitride could be represented by a general formula  $A_xB_yC_{1-x-y}N$  (col. 5, lines 46-50), where A, B, and C (aluminum, indium, and gallium) are group III elements (col. 5, lines 37-40). Therefore, it is obvious the first p-type clad layer 15 contain indium and gallium;
- An active layer provided between the n-type and p-type nitride semiconductor clad layer having a quantum well structure (col. 4, line 66 to col. 5, line 26) having a well layer comprising a nitride semiconductor represented by  $In_xGa_{1-y}N$ ,  $0 \leq y < 1$  (col. 5, line 32);
- Edmond et al. disclose a first p-type AlGaN clad layer 15, but do not disclose a second p-type clad layer. However, However, Mannou et al. disclose a first p-type clad layer 44 and a second p-type cladding layer 46 (Mannou col. 3, lines 35-60). Mannou et al. teach the multiple cladding layers would suppress diffusion of dopants and would increase yield of the device (Mannou col. 1, lines 62-66).

Hence, it would have been obvious to one with ordinary skill in the art to modify the device in US 5,652,434 with the teaching of Mannou et al. to provide a second p-type clad layer in order to prevent diffusion of dopants;

- A p-type GaN contact layer 16 (col. 6, lines 11-13).

With regard to claim 71, in addition to the limitations disclosed in claim 63 and 64,

Edmond et al. also discloses:

- An first n-type AlInGaN clad layer 14 (col. 5, lines 36-50 and fig. 1);
- Edmond et al. disclose the first n-type layer comprising an n-type nitride semiconductor containing aluminum, indium, and gallium (col. 5, lines 36-50 and fig. 1), but does not disclose a second n-type clad layer. However, the p-type cladding could have two separate layers to minimize diffusion of dopants and, therefore, the n-type cladding could also have two separate layers, which is merely a duplication of useful parts. Duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).

Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edmond et al. (US 5,592,501) modified by Hayakawa et al. (US 4,759,024) as applied to claim 63 above, and further in view of Chai (US 5,625,202).

With regard to claim 66, Edmond et al. disclose the p-type contact formed of p-type GaN, but do not disclose an n-type contact formed of an n-type GaN. However, it is common to have

an n-type contact layer in the LED device, such as Chai (fig. 8). Therefore, it is obvious to provide an n-type GaN contact layer and over which the second n-type clad layer is provided.

### ***Response to Arguments***

Applicant's arguments filed 1/16/04 have been fully considered:

- Applicant argues that US 5,652,434 does not disclose or suggest a clad layer (see page 6, second paragraph). However, the clad layer is not in the original claim 64.
- Applicant argues that US 5,652,434 does not disclose or suggest an InGaN well layer (see page 6, second paragraph). However, the InGaN well layer is not in the original claim 64.
- Applicant argues that it is illogical to combine US 5,652,434, relating to a horizontal device, with Edmond et al., relating a vertical device (see page 6, fourth paragraph). However, US 5,652,434 does not claim a horizontal device.
- Applicant argues that Mannou et al. disclose the clad layers are made of AlInGaP, which is not a nitride semiconductor (see page 6, fifth paragraph). However, examiner relays on the teaching of Mannou et al. to prevent the dopants diffusion into the active layer (Mannou col. 1, lines 62-66) to provide a multiple clad layers in US 5,652,434's device. US 5,652,434 already provide the aluminum, indium, and gallium material of the clad layers.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (571) 272-1709. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wsl   
March 8, 2004.

LONGPHAM  
PRIMARY EXAMINER